

UNIT-II

WEB TECHNOLOGIES

Points to be covered in this topic

- INTRODUCTION
- HTML
- XML
- CSS
- PROGRAMMING LANGUAGES
- WEB SERVER
- DATABASE
- MYSQL
- MS ACCESS
- PHARMACY DRUG DATABASES

WEB TECHNOLOGIES

□ INTRODUCTION

- Web Technologies are playing the leading role in the **World Wide Web includes many latest evolutions** in it like **Web Services, Web 2.0, Table less Design, HTML, XHTML, XML, CSS 2.0** etc.
- Web technology aims to **enhance creativity, secure information sharing, collaboration and functionality** of the web.
- Web Technologies have been developing since last 15- 20 years and are still. **Web 2.0, Web 3.0** are the main revolutionary Technologies of it.

□ HTML

- HTML stands for **Hyper Text Markup Language**.
- It is used to **design web pages** using markup language.
- HTML is the **combination of Hypertext and Markup language**.
- **Hypertext** defines the link between the web pages.
- **Markup language** is used to define the text document within tag which defines the structure of web pages.
- This language is used to **annotate (make notes for the computer) text** so that a machine can **understand it and manipulate text accordingly**.
- Most of markup (e.g. HTML) languages are **human readable**.
- Language uses **tags to define what manipulation has to be done** on the text.
- HTML is a markup language which is used by the **browser to manipulate text, images and other content** to display it in required format.
- The first ever version of HTML was HTML 1.0 but the first standard version was HTML 2.0 which was published in 1999.



HTML VERSION	YEAR
HTML 1.0	1991
HTML 2.0	1995
HTML 3.2	1997
HTML 4.01	1999
XHTML	2000
HTML 5	2014

- **Elements and Tag:** HTML uses **predefined tags** and elements which tells the browser about content display property. If a **tag is not closed then browser applies that effect till end of page.**
- **HTML page structure:** The Basic structure of HTML page is given below. It contain some elements **like head, title, body, ...** etc. These elements are **used to build the blocks of web pages.**
- **<DOCTYPE! html>:** This tag is used to tells the HTML version. This currently tells that the version is HTML 5.
- **<html>:** This is called **HTML root element** and used to wrap all the code.
- **<head>:** Head tag contains **metadata, title, page CSS etc.** All the HTML elements that can be used inside the <head> element are:

- ✓ **<style>**
- ✓ **<title>**
- ✓ **<base>**
- ✓ **<noscript>**
- ✓ **<script>**
- ✓ **<meta>**
- ✓ **<title>**

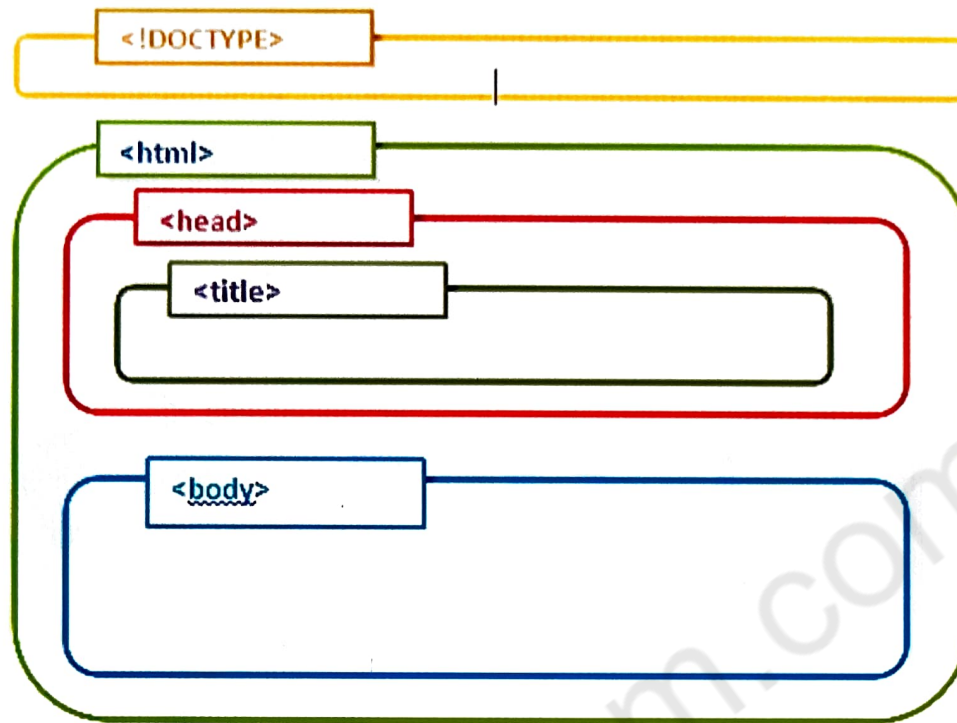
```

webpage - Notepad
File Edit Format View Help

<!doctype html>
<html>
  <head>
    <title>Document title</title>
  </head>
  <body style="background-color:black;">
    <center>
      
      <a href="https://www.mywebsite.com/home"><img src=
      "https://www.mywebsite.com/home_button.jpg"
      <a href="https://www.mywebsite.com/page2"><img src=
      "https://www.mywebsite.com/next_button.jpg"
    </center>
    <br>
    <h1 style="color:white;">About Us</ht>
    <br>
    <p style='color:white;'>A little about us...</p>
    <hr>
  </body>
</html>

```

- **<body>**: Body tag is used to **enclosed all the data which a web page has from texts to links**. All of the content that you see rendered in the browser is contained within this element.



HTML Page structure

➤ Features of HTML:

- It is easy to learn and **easy to use**.
- It is **platform independent**.
- **Images, video and audio** can be added to a web page.
- **Hypertext** can be added to text.

➤ Why learn HTML?

- It is a **simple** markup language. Its **implementation is easy**.
- It is used to create a website.
- Helps in **developing fundamentals about web programming**.

➤ Advantages:

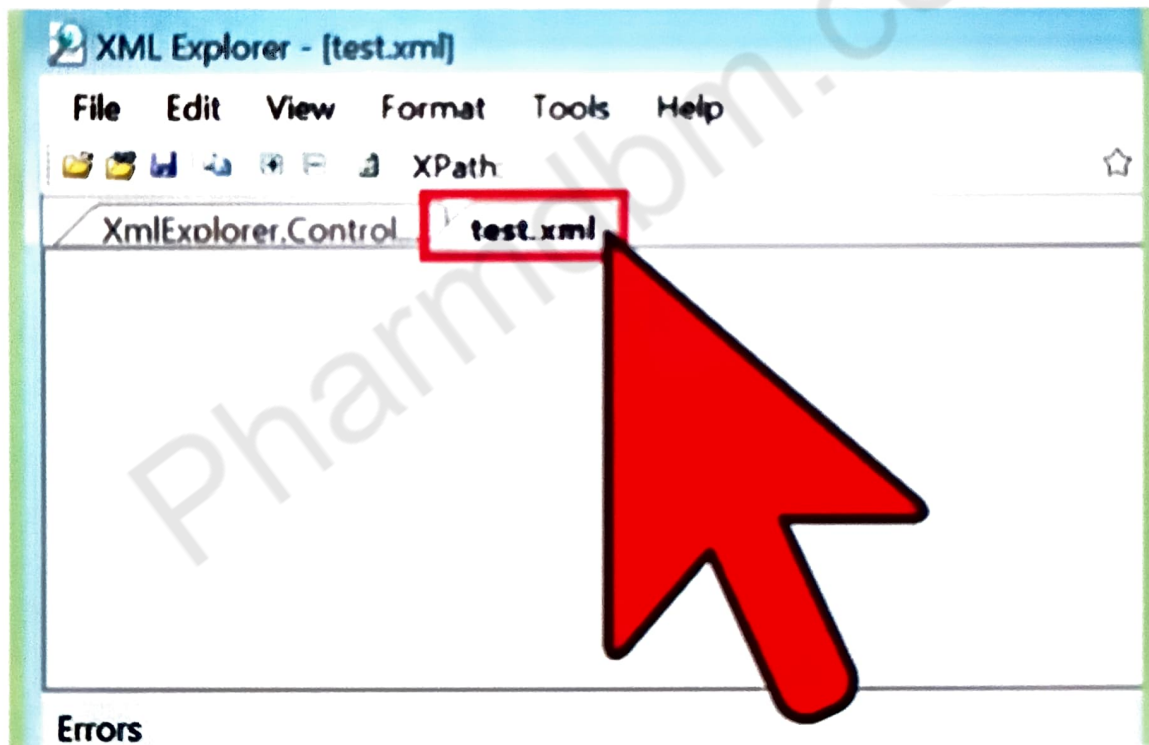
- HTML is used to **build a websites**.
- It is **supported by all browsers**.
- It can be integrated with other **languages like CSS, JavaScript** etc.

➤ Disadvantages:

- HTML can create **only static webpages** so for dynamic web page other languages have to be used.
- **Large amount of code has to be written** to create a simple web page.
- **Security feature is not good.**

❑ XML

- XML stands for **extensible Markup Language**
- XML is a markup language **much like HTML**
- XML was **designed to store and transport data**
- XML was designed to be self-descriptive
- XML is a **W3C Recommendation**



➤ The Difference Between XML and HTML

XML and HTML were designed with different goals:

- XML was designed to **carry data - with focus on what data is.**
- HTML was designed **to display data - with focus on how data looks**
- XML tags are **not predefined** like HTML tags are

➤ XML Does Not Use Predefined Tags

- The XML language has no predefined tags.
- The tags in the example above (like `<to>` and `<from>`) are not defined in anything XML standard. These tags are "invented" by the author of the XML document.
- HTML works with predefined tags like `<p>`, `<h1>`, `<table>`, etc.
- With XML, the author must define both the tags and the document structure.

➤ XML is Extensible

- Most XML applications will work as expected even if new data is added (or removed).
- Imagine an application designed to display the original version of `note.xml` (`<to>` `<from>` `<heading>` `<body>`).
- Then imagine a newer version of `note.xml` with added `<date>` and `<hour>` elements, and a removed `<heading>`.

➤ XML Simplifies Things

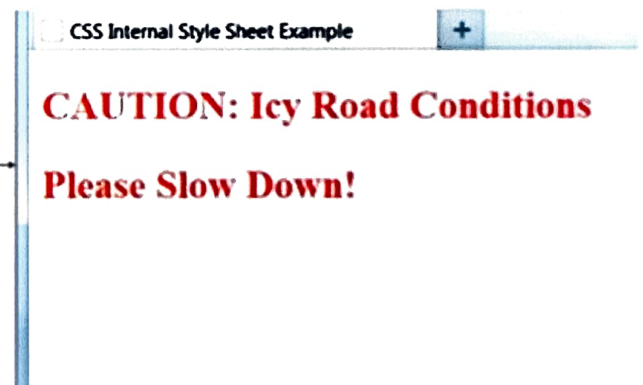
- It simplifies data sharing
 - It simplifies data transport
 - It simplifies platform changes
 - It simplifies data availability
- ✓ Many computer systems contain data in incompatible formats. Exchanging data between incompatible systems (or upgraded systems) is a time-consuming task for web developers.
- ✓ Large amounts of data must be converted, and incompatible data is often lost.

- ✓ XML stores data in plain text format. This provides a **software- and hardware-independent way of storing, transporting, and sharing data.**
- ✓ XML also makes it easier to **expand or upgrade to new operating systems**, new applications, or new browsers, without losing data.
- ✓ With XML, data can be **available to all kinds of "reading machines" like people, computers, voice machines**, news feeds, etc.

□ CSS

- **Cascading Style Sheets**, fondly referred to as CSS, is a simply designed language intended to **simplify the process of making web pages presentable.**
- CSS allows you to **apply styles to web pages.**
- CSS is designed to enable the **separation of presentation and content**, including **layout, colors, and fonts.**
- This separation can **improve content accessibility, provide more flexibility and control in the specification of presentation characteristics**, enable multiple web pages to share formatting by specifying the relevant CSS in a separate.

```
<head>
...
<style type="text/css">
  h2 {color:red;}
</style>
</head>
<body>
  <h2>CAUTION: Icy Road Conditions</h2>
  <h2>Please Slow Down!</h2>
</body>
```



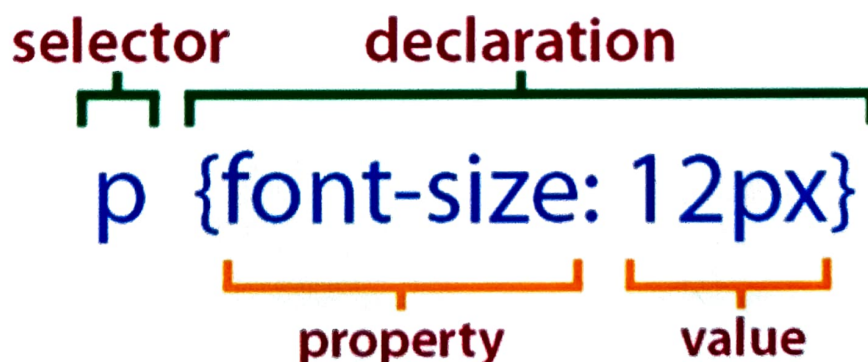
- The name cascading comes from the **specified priority scheme to determine which style rule applies** if more than one rule matches a particular element.

➤ Advantages:

- **CSS saves time:** You can write CSS once and reuse same sheet in multiple HTML pages.
- **Easy Maintenance:** To make a global change simply change the style, and all elements in all the webpages will be updated automatically.
- **Search Engines:** CSS is considered as clean coding technique, which means search engines won't have to struggle to "read" its content.
- **Superior styles to HTML:** CSS has a much wider array of attributes than HTML, so you can give a far better look to your HTML page in comparison to HTML attributes.
- **Offline Browsing:** CSS can store web applications locally with the help of offline cache. Using of this we can view offline websites.

➤ CSS Syntax

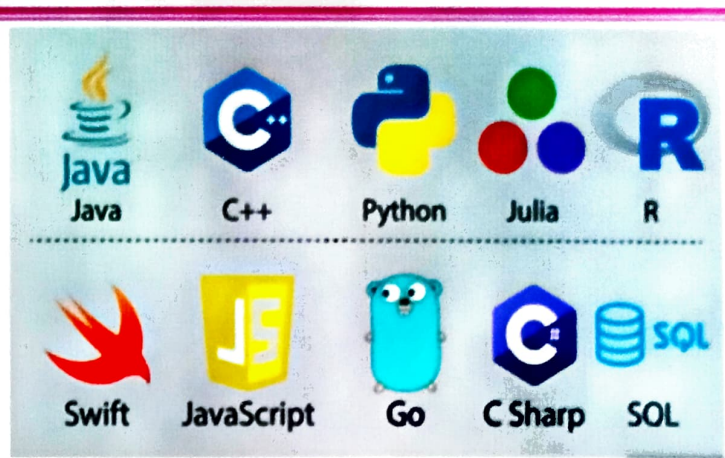
- A CSS comprises of **style rules that are interpreted by the browser** and then **applied to the corresponding elements** in your document.
- A style rule set consists of a **selector and declaration block**.
- The selector points to the HTML element you want to style.
- The declaration block **contains one or more declarations separated by semicolons**.
- Each declaration includes a CSS property name and a value, separated by a colon.



❑ PROGRAMMING LANGUAGES

➤ Introduction

- A programming language is a set of rules that **provides a way of telling a computer what operations to perform.**



- A programming language is a **set of rules for communicating an algorithm.** It provides a linguistic framework for describing computations.
- A programming language is a **notational system for describing computation in a machine-readable and human-readable form.**
- A programming language is a tool for **developing executable models** for a class of problem domains.
- English is a natural language. It has words, symbols and grammatical rules. A programming language also has words, symbols and rules of grammar.
- The **grammatical rules are called syntax.** Each programming language has a different set of syntax rules.
- Programming languages have evolved over time as better ways have been developed to design them.
- Different programming languages are **designed for different types of programs.**

➤ Generations of PL

- ✓ First Generation Languages
- ✓ Second Generation Languages
- ✓ Third Generation Languages
- ✓ Fourth Generation Languages
- ✓ Fifth Generation Languages

○ **First Generation Languages**

- **Machine language**

- ✓ **Operation code** - such as addition or subtraction.
- ✓ **Operands** - that identify the data to be processed.
- ✓ Machine language is machine dependent as it is the **only language the computer can understand.**
- ✓ Very efficient code but very **difficult to write.**

○ **Second Generation Languages**

- **Assembly languages**

- ✓ **Symbolic operation codes** replaced binary operation codes.
- ✓ Assembly language programs needed to be **"assembled" for execution by the computer.**
- ✓ Each assembly language instruction is **translated** into **one machine language instruction.**
- ✓ Very efficient code and **easier to write.**

○ **Third Generation Languages**

- ✓ **Closer to English** but included **simple mathematical notation.**
- ✓ Programs written in source code which must be **translated into machine language programs called object code.**
- ✓ The translation of **source code to object code** is accomplished by a machine language system program **called a compiler.**
- ✓ **Alternative to compilation is interpretation** which is accomplished by a system program called an interpreter.
- ✓ Common third generation languages: **FORTRAN, COBOL, C and C++ Visual Basic.**

○ **Fourth Generation Languages**

- ✓ A high level language (4GL) that requires **fewer instructions to accomplish a task than a third generation language.**
- ✓ Used with **databases ,Query languages ,Report generators ,Forms designers ,Application generators.**

○ **Fifth Generation Languages**

- ✓ **Declarative languages**
- ✓ **Functional: Lisp, Scheme, SML** Also called applicative Everything is a function
- ✓ **Logic: Prolog - Based on mathematical logic Rule- or Constraint-based**

○ **Beyond Fifth Generation Languages**

Though **no clear definition** at present, natural language programs generally can be interpreted and executed by the computer with no other action by the user than stating their question. Limited capabilities at present.

➤ **PL have two broad groups**

- **Traditional programming languages**
 - ✓ Sequences of instructions
 - ✓ First, second and some third generation languages
- **Object-oriented languages**
 - ✓ Objects are created rather than sequences of instructions
 - ✓ Some third generation, and fourth and fifth generation languages

Traditional Programming Language

FORTRAN

- ✓ **FORmula TRANslation.**
- ✓ **Developed at IBM in the mid-1950s.**
- ✓ Designed for **scientific and mathematical applications by scientists and engineers.**

COBOL

- ✓ **Common Business Oriented Language.**
- ✓ Developed in 1959.
- ✓ Designed to be **common to many different computers.**
- ✓ Typically used for business applications.

BASIC

- ✓ Beginner's **All-purpose Symbolic Instruction Code.**
- ✓ Developed at Dartmouth College in mid 1960s
- ✓ Developed as a **simple language for students to write programs** with which they could interact through terminals.

C

- ✓ Developed by **Bell Laboratories in the early 1970s**
- ✓ Provides **control and efficiency of assembly language** while having third generation language features.
- ✓ Often used for system programs.
- ✓ **UNIX is written in C.**

Object Oriented Programming Language

Simula

- ✓ **First object-oriented language.** Developed by Ole Johan Dahl in the 1960s.
- ✓ **Smalltalk.**
- ✓ Still in use on some computers.

C++

- ✓ It is **C language with additional features.**
- ✓ Widely used for **developing system and app software.**
- ✓ **Graphical user interfaces** can be developed easily with visual programming tools.

JAVA

- ✓ An **object-oriented language similar to C++** that eliminates lots of C++'s problematic features
- ✓ Allows a web page developer to **create programs for applications, called applets.**
- ✓ Objective of JAVA developers is that it be machine, platform and operating system independent

Special Programming Language

- Languages designed for **one specific purpose**, not general-purpose programming languages

SQL, Structured Query Language

- ✓ Ask questions about data in a database HTML (Hyper Text Markup Language)
- ✓ Describes the formatting of webpages

JavaScript

- ✓ Lightweight scripting language for active webpages
- ✓ Code is embedded in the HTML for the page

R

- ✓ Specialized language designed for statistics and graphics

❑ WEB SERVER

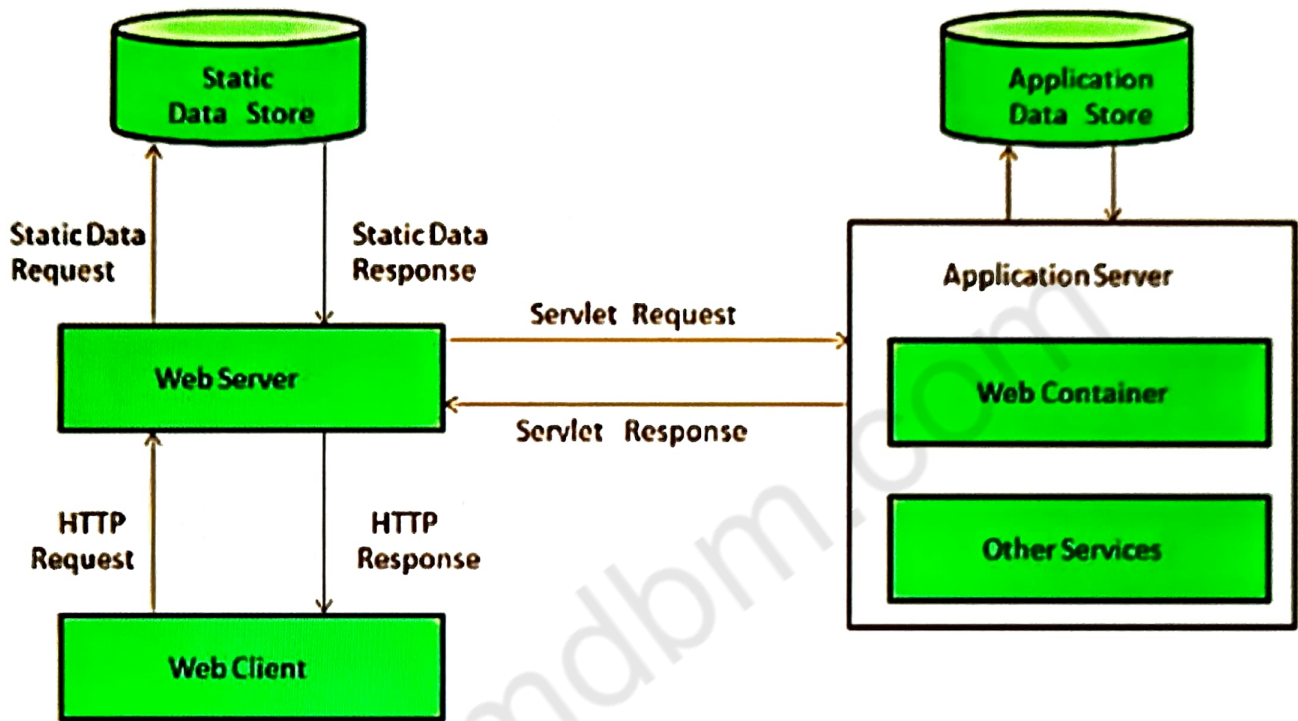
- Web server is a computer where the **web content is stored.**
- Basically web server is used **to host the web sites** but there exists other web servers also such as gaming, storage, FTP, email etc.
- **Web site is collection of web pages** while **web server is a software that respond to the request for web resources.**



Web Server Working

Web server respond to the client request in either of the following **two ways**:

- ✓ **Sending the file to the client** associated with the requested URL.
- ✓ **Generating response** by invoking a script and communicating with database.



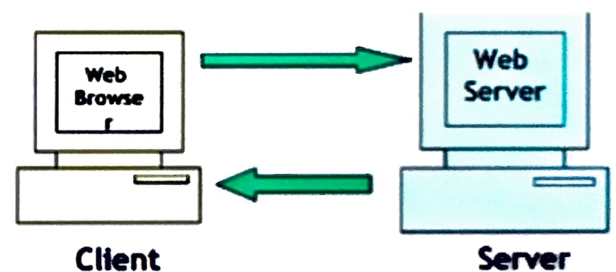
Key Points

- ✓ When client sends request for a web page, the web server search for the requested page if requested page is found then it will send it to client with an HTTP response.
- ✓ If the requested web page is not found, web server will the send an **HTTP response: Error 404 Not found**.

➤ Architecture

Web Server Architecture follows the following **two approaches**:

1. **Concurrent Approach**
2. **Single-Process-Event-Driven Approach**.



■ Concurrent Approach

Concurrent approach allows the web server to **handle multiple client requests at the same time**. It can be achieved by following methods:

- ✓ Multi-process
- ✓ Multi-threaded
- ✓ Hybrid method.

Multi-processing

- In this a **single process (parent process)** initiates several **single-threaded child processes** and distribute incoming requests to these child processes. Each of the child processes are responsible for handling single request.
- It is the **responsibility of parent process to monitor the load and decide** if processes should be killed or forked.

Multi-threaded

- Unlike Multi-process, it **creates multiple single-threaded process**.

Hybrid

- It is combination of above **two approaches**.
- In this approach **multiple process are created and each process initiates multiple threads**.
- **Each of the threads handles one connection**. Using multiple threads in single process results in **less load on system resources**.

➤ System architecture

- A web server is part of a **multi-tier application**.
- **Functionality is divided into separate tiers** or groupings.
- Tiers can be on **same computer or on separate computers**.

Web applications are often three tiered:

- ✓ Information tier (also called data tier)

- ✓ Middle tier
- ✓ Client tier (user interface tier)

Common web system architecture

Client tier	Web Browser	Application User interface. The client interacts with the middle tier to make requests and to retrieve data from the information tier.
Middle tier	Application tier	Controls the interactions between the application clients and application data. Enforces business rules. implements presentation logic. Web server typically supports this tier.
Information tier	Database	Maintains data for the application. Data typically stores in a relational database management system (RDBMS)

❑ DATABASE

- A database is a **collection of organized data, information and records.**

➤ Purpose of a Database

- Database is **information** that a person needs in his **personal, business, social and religious life** and the power and purpose of information is not only in **collecting and finding them** but more importantly in **using them.**

➤ Kinds of Databases

✓ Structured database

- It is also called the structured data in which a **record or file of information arranged in uniform format.**
- These databases are usually **storage of information with similar entries** such as a **list of persons born in a country, a medical database of patients' data, an inventory database of a company** and many others.

✓ Free-form database

- It is a **loose collection of information**, such as those you will find on the **World Wide Web**.
- A collection of your documents in the computer made from several programs can be considered as **free-form database**.

➤ Types of Databases

✓ Operational database

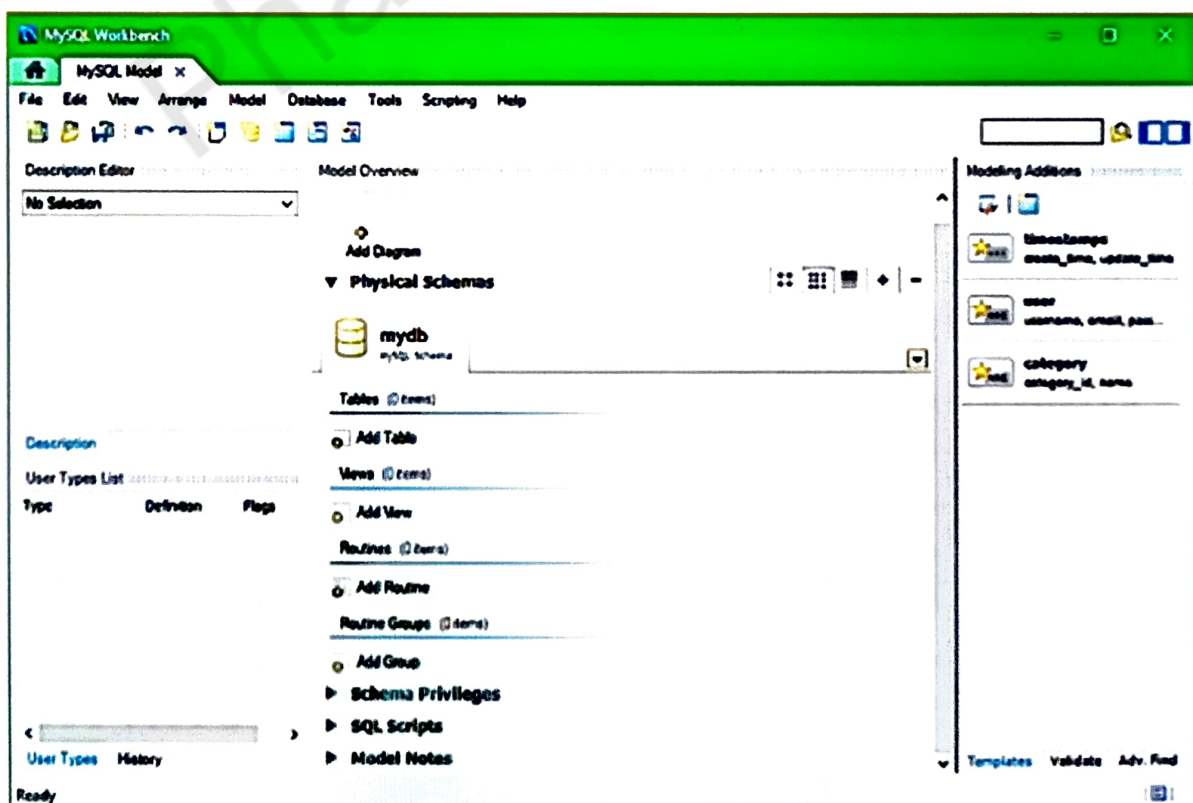
- It is a dynamic database that is used by any organization in its **day-to-day operation**. They are used to collect data, maintain, modify and delete data.

✓ Analytical database

- It is a static database, **where data is rarely modified**. This database is often used to store and track historical data to make long term projections and analysis.

❑ MYSQL

- MySQL is a **fast, easy-to-use RDBMS** being used for many **small and big businesses**.



- MySQL is **developed, marketed and supported by MySQL AB**, which is a Swedish company. MySQL is becoming so popular because of many good reasons.
- MySQL is released under an **open-source license**. So you have nothing to pay to use it.
- MySQL is a very powerful program in its own right. It **handles a large subset of the functionality** of the most expensive and powerful database packages.
- MySQL uses a standard form of the **well-known SQL data language**.
- MySQL works on many operating systems and **with many languages** including **PHP, PERL, C, C++, JAVA, etc.**
- MySQL works very quickly and works well even **with large data sets**.
- **MySQL is very friendly to PHP**, the most appreciated language for web development.
- MySQL supports large databases, **up to 50 million rows or more in a table**. The default file size limit for a table is 4GB, but you can increase this to a theoretical limit of **8 million terabytes (TB)**.
- MySQL is customizable. The open-source GPL license allows programmers to **modify the MySQL software** to fit their own specific environments.

➤ **Who Uses MySQL?**

- Huge websites like **Facebook, Twitter, Airbnb, Booking.com, Uber, GitHub, YouTube**, etc.
- Content Management Systems like **WordPress, Drupal, Joomla!, Contao**, etc.

☐ MS ACCESS

- Ms Access is a **database management tool** that enables one to **have good command of data collected**.
- The programme enables one to **retrieve, sort, summarize and report results speedily and effectively**.
- It can **combine data from various files through creating relationships**, and can make data entry more efficient and accurate.
- Microsoft Access (MS Access) enables one to **manage all important information from a single database file**.
- Within the file, one can use:
 - ✓ **Tables** to store your data.
 - ✓ **Queries** to find and retrieve specific data of interest.
 - ✓ **Forms** to view, add, and update data in tables.
 - ✓ **Reports** to analyze or print data in a specific layout.
 - ✓ **Data access pages** to view or update, the data.
- In MS Access, data is stored once in one table, but can be **viewed from multiple locations**. When the data is updated in a **Table, Query or Form**, it is automatically updated everywhere it appears.

ID	First Name	Last Name	Street Address
1	Tracey	Beckham	7 East Walker Dr.
2	Lucinda	George	789 Brewer St.
3	Jerrold	Smith	211 St. George Ave.
4	Brett	Newkirk	47 Hillsborough St.
5	Chloe	Jones	23 Solo Ln.
6	Quinton	Boyd	4 Cypress Cr.
7	Alex	Hinton	1011 Hodge Ln.
8	Nisha	Hall	123 Huntington St.
9	Hillary	Clayton	2516 Newman
10	Kiara	Williams	9014 Miller Ln.
11	Katy	Jones	456 Denver Rd.
12	Beatrix	Joslin	85 North West St.
13	Mariah	Allen	12 Jupe

❑ PHARMACY DRUG DATABASES

- Drug databases are sites where **information about drugs and medications are stored**, and one of the largest (and most commonly used) drug databases is compiled by the **Food & Drug Administration (FDA)**.
- The FDA is a **federal agency** that oversees and controls all medications in the U.S., which includes:
 - ✓ Over-the-counter (OTC) medications
 - ✓ Prescription medications
 - ✓ Dietary supplements
 - ✓ Vaccines
- The FDA drug database includes most of the drugs they have **approved in the U.S. since 1939**.
- Best of all, this database is extremely easy to use. To search this database, you **simply need to go to the FDA drug database's website**.
- Once you get to this website, you are able to **search the database by typing in the name of the drug or by typing in any active ingredient of a drug**.
- Additionally, the FDA drug database can be used to search drugs that are **currently going through clinical trials** and/or the approval process.
- The FDA must approve a drug before it is **legally able to be sold and used in the United States**.
- Therefore, drug companies must formally **submit an application to the FDA** for the drug to be approved.
- The drugs that have been **submitted to the FDA but not yet approved** can be found in this database.